

Claims

What is claimed is:

1. A circuit for connecting to a power supply having power supply noise, the circuit for amplifying an input signal from a photodetector comprising:

a transimpedance amplifier (TIA) circuit for operating in a differential manner and having a gain and a first input port for receiving the input signal from the photodetector, a second input port and an output port, the TIA for providing a TIA output signal comprising a voltage ripple signal dependent on the power supply noise and an amplified signal dependent on the input signal and the gain of the TIA;

a first biasing circuit coupled to the second input port for providing a first bias signal thereto, the first bias signal including the voltage ripple signal dependent on the power supply noise; and,

a filter circuit coupled to the output port of the TIA for filtering the TIA output signal to form a filtered signal, the filter circuit for filtering the TIA output signal in dependence upon an AC component of the first bias signal and for providing the filtered signal to a filter output port thereof.

2. A circuit according to claim 1 wherein the filter circuit comprises a high pass filter circuit for attenuating low frequency components of the voltage ripple signal provided to the filter output port.

3. A circuit according to claim 1 wherein the filter circuit comprises a low pass filter for attenuating high frequency components of the TIA output signal provided to the filter output port.

4. A circuit according to claim 1 comprising a differential amplifier having a positive input port for receiving the TIA output signal and having a negative input port for receiving the filtered signal, the differential amplifier having a two output ports for providing a differential output signal therefrom, the differential output signal

representative of an amplified difference between these two input signal and an attenuated other than a difference between these two input signals.

5. A circuit according to claim 4 comprising a unity gain buffer disposed between the negative input port of the differential amplifier and the filter output port for reducing a DC voltage level offsets for input signals received between the two input ports of the differential amplifier.
6. A circuit according to claim 4 wherein the circuit other than comprises a dummy TIA for DC biasing of one of the negative input port and the positive input port of the differential amplifier.
7. A circuit according to claim 1 wherein the biasing circuit comprises:
a first current source for providing a portion of a first current to the second input port of the TIA and another portion of the first current to the filter circuit.
8. A circuit according to claim 7 wherein the biasing circuit comprises:
a second resistor disposed between a first voltage input port for receiving a positive voltage and the positive input port of the TIA.
9. A circuit according to claim 8 wherein the biasing circuit comprises:
a second capacitor disposed in parallel with the first current source, the second capacitor for reducing the thermal noise contributions of the second resistor.
10. A circuit according to claim 7 wherein the biasing circuit comprises: other than a resistor potential divider circuit.
11. A circuit according to claim 1 wherein the TIA comprises circuitry for operating as a unity gain voltage amplifier

12. A circuit according to claim 1 wherein the differential amplifier comprises circuitry for providing a high differential gain and a high common mode rejection when amplifying input signals to provide output signals.

13. A method of performing power supply noise rejection for providing an output signal comprising the steps of:

providing a TIA having two input ports;

providing an input signal for amplification to a negative input port of the TIA;

providing a first bias signal having a voltage ripple to a positive input port of the TIA;

amplifying the input signal to form a portion of an amplified signal, the amplified signal comprising a noise signal representative of power supply noise and an amplified version of the input signal;

filtering the amplified signal to form a filtered signal comprised of power supply noise;

differentially amplifying the filtered signal and the amplified signal to provide an output signal from the amplifier circuit having an amplified version of the input signal and an attenuated version of the power supply noise.

14. A method according to claim 13 wherein a magnitude of the voltage ripple provided in the amplified signal is of an approximately same magnitude as the voltage ripple provided at the output port of the filter circuit.

15. A method according to claim 13 wherein the TIA amplifies the input signals in a differential manner.

16. A method according to claim 13 wherein the negative input port of the TIA is a low impedance input port.

17. A method according to claim 13 wherein the positive input port of the TIA is a high impedance input port and is used for providing DC bias to the negative input port.

18. A single ended to dual conversion circuit comprising:

a transimpedance amplifier (TIA) circuit for operating in a differential manner and having a gain and a first input port for receiving the input signal from the photodetector, a second input port and an output port, the TIA for providing a TIA output signal comprising a voltage ripple signal dependent on the power supply noise and an amplified signal dependent on the input signal and the gain of the TIA;

a first biasing circuit coupled to the second input port for providing a first bias signal thereto, the first bias signal comprising the voltage ripple signal dependent on the power supply noise;

a filter circuit coupled to the output port of the TIA for filtering the TIA output signal to form a filtered signal, the filter circuit for filtering the TIA output signal in dependence upon an AC component of the first bias signal and for providing the filtered signal to a filter output port thereof; and

a differential amplifier having a positive input port for receiving the TIA output signal and having a negative input port for receiving the filtered signal, the differential amplifier having a two output ports for providing a differential output signal therefrom, the differential output signal representative of an amplified difference between these two input signal and an attenuated other than a difference between these two input signals.